SPECIFICATION

TITLE OF THE INVENTION

PROCESS FOR STARTING A DATA PROCESSING INSTALLATION, AND ASSOCIATED COMPONENTS

BACKGROUND OF THE INVENTION

The present invention relates to a process in which a bootstrap program is stored in a bootstrap memory unit. A processor executes the program commands of the bootstrap program and in so doing controls a transfer operation. During the transfer operation, program commands are transferred from a reload memory unit to the main memory unit. After the transfer operation, the processor starts executing the commands stored in the main memory during the transfer operation.

Processes for starting a data processing installation are also referred to as bootstrap processes or boot processes. In known processes such as are customary in personal computers, the bootstrap program is stored in a ROM (Read Only Memory). The bootstrap program is part of the "BIOS" (Basic Input Output System). The ROM store permits parallel access to the bit positions of a data word having a number of bits. During the start operation, the processor of the data processing installation executes the commands of the bootstrap program stored in the ROM. In this context, it gains read access to the ROM storage unit. During the start operation, the operating system is copied from the reload memory unit to the main memory unit.

The reload memory unit is a memory unit which stores data even after the operating voltage has been turned off; i.e., a "nonvolatile" memory unit. The reload memory unit used is, by way of example, a "hard disk" storing several hundred megabytes or several gigabytes.

The main memory unit is a memory unit which loses its stored data after the operating voltage has been turned off; i.e., a "volatile" memory unit. The main memory unit used is RAM (Random Access Memory). The fact that the main memory unit loses its stored data when turned off means that, after turning on, the operating system needs to be transferred to the main memory unit again. The main

memory unit also has a shorter access time than the reload memory unit. Hence, for the data processing installation to operate rapidly, the operating system likewise needs to be transferred from the reload memory unit to the main memory unit.

It is an object of the present invention to specify, for starting a data processing installation, a simple process which can be performed using reduced component complexity. In addition, the aim is to specify an associated data processing installation, an associated control unit and an associated program.

SUMMARY OF THE INVENTION

The present invention is based on the consideration that a memory unit for parallel access to the stored data or to data which are to be stored needs to have a multiplicity of connections. This makes the component comparatively large and requires that it take up a relatively large amount of physical space on a printed circuit board or on a chip. By contrast, a memory unit with serial access to the data is of simpler design and requires fewer connections; for example, only two voltage connections, a control connection and a connection for data input and output. As such, serial memory units are less complex to manufacture than memory units with parallel access. The reduced number of connections allows the amount of physical space required also to be less.

In the case of the inventive process, the bootstrap memory unit and/or the reload memory unit is, therefore, a serial-access memory unit or a memory unit which requires a number of read operations in order to read a program command. Such a practice allows memory units which are simple to manufacture and can be manufactured at low cost to be used for the memory units. In the text below, serial access also relates to multiple access for reading a program command. If the reload memory unit is a serial-access memory unit, then a parallel-access memory unit can be used for storing the bootstrap program, as is customary to date. The expenditure on components to be used is reduced further, however, if both the bootstrap memory unit and the reload memory unit are serial-access memory units.

On the other hand, a serial-access memory unit also can be used just for the bootstrap memory unit in order to use the inventive effects. The reload memory unit used, as previously, may be a parallel-access memory unit; e.g., a hard disk.

In one embodiment of the inventive process, the bootstrap memory unit used is a serial-access memory unit. A processor is thus not able to execute the program stored in the bootstrap memory unit directly. In the case of the development, therefore, in a bootstrap transfer operation, the program commands of the bootstrap program are transferred from the bootstrap memory unit to the main memory unit using a control circuit. After the bootstrap transfer operation, the processor starts executing the program commands transferred to the main memory unit during the bootstrap transfer operation, and hence starts the reload transfer operation.

In a subsequent embodiment, the control unit is a binary control unit in which the control function is prescribed by the interconnection of logic circuits. The control function is thus not prescribed by a program which needs to be executed by a processor. To perform the functions of the control unit, large-scale-integrated user-specific circuits are used. In the case of "ASICs" (user-specific IC) and FPGAs, logic circuit elements of the circuit are interconnected in a programming operation as prescribed by the user. The user-specific circuits used are PLDs (Programmable Logic Device), PLAs (Programmable Logic Array), PAL (Programmable Array Logic). The control unit is of simple design as compared with a microprocessor, however.

In an embodiment, during the bootstrap operation, the control unit keeps the processor in a state in which it executes no commands. This can be achieved by permanently applying a reset signal to the reset input of the processor. Another option is to interrupt the clock generation for the processor. In the case of this development, the control unit enables commands to be executed after the bootstrap transfer operation is complete. Execution can be enabled by switching over the reset signal.

In another embodiment, the bootstrap memory unit is a nonvolatile memory unit. As already mentioned, the bootstrap memory unit used can be a serial memory